



#### General

#### Guideline Title

EAACI food allergy and anaphylaxis guidelines. Primary prevention of food allergy.

#### Bibliographic Source(s)

Muraro A, Halken S, Arshad SH, Beyer K, Dubois AE, Du Toit G, Eigenmann PA, Grimshaw KE, Hoest A, Lack G, O'Mahony L, Papadopoulos NG, Panesar S, Prescott S, Roberts G, de Silva D, Venter C, Verhasselt V, Akdis AC, Sheikh A, EAACI Food Allergy and Anaphylaxis Guidelines Group. EAACI food allergy and anaphylaxis guidelines. Primary prevention of food allergy. 2014 May;69(5):590-601. [98 references] PubMed

#### Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

### Recommendations

## Major Recommendations

Definitions of the level of the evidence (I–V) and grades of recommendation (A–D) are provided at the end of the "Major Recommendations" field.

Refer to Box 5 in the original guideline document for more information on key terms used in this guideline.

Recommendations for Primary Prevention of Food Allergy

- Exclusive breastfeeding is recommended for all infants for the first 4–6 months (Evidence level: II–III; Grade: C) (de Silva et al., 2014; Muraro et al., 2004; Kull et al, 2010; Venter et al., 2009; Høst, Husby, & Østerballe, 1988; Lucas et al., 1990).
- Dietary restrictions are not recommended for all pregnant or lactating mothers (Evidence level: I–II; Grade: B) (de Silva et al., 2014).
- If breastfeeding is insufficient or not possible:
  - High-risk infants should receive a hypoallergenic formula with documented preventive effect for the first 4 months. Other infants may receive a standard formula. After the age of 4 months, a standard cow's milk-based formula is recommended according to standard nutrition recommendations, irrespective of atopic heredity (Evidence level: I; Grade: A–B) (de Silva et al., 2014; Muraro et al., 2004; Zeiger et al., 1989; Zeiger, Heller, & Sampson, 1992; Zeiger & Heller, 1995; Odelram et al., 1996; von Berg et al., 2003; von Borg et al., 2008).
- Introduction of complementary foods after the age of 4 months according to normal standard weaning practices and nutrition recommendations, for all children irrespective of atopic heredity (Evidence level: II–III; Grade: C) (de Silva et al., 2014).

• No special dietary restrictions after the age of 4 months for infants with high risk for development of allergic disease No withholding or encouraging exposure to "highly allergenic" foods such as cow's milk, hen's egg, and peanuts irrespective of atopic heredity, once weaning has commenced (Evidence level: II–III; Grade: C) (de Silva et al., 2014).

#### **Definitions**:

#### Level of Evidence

Level I	Systematic reviews, meta-analysis, randomized controlled trials
Level II	Two groups, nonrandomized studies (e.g., cohort, case-control)
Level III	One group nonrandomized (e.g., before and after, pretest, and post-test)
Level IV	Descriptive studies that include analysis of outcomes (single-subject design, case series)
Level V	Case reports and expert opinion that include narrative literature, reviews, and consensus statements

#### Grades of Recommendation

Grade A	Consistent level I studies
Grade B	Consistent level II or III studies or extrapolations from level I studies
Grade C	Level IV studies or extrapolations from level II or III studies
Grade D	Level V evidence or troublingly inconsistent or inconclusive studies at any level

# Clinical Algorithm(s)

None provided

# Scope

# Disease/Condition(s)

Food allergy and anaphylaxis

# Guideline Category

Prevention

Risk Assessment

# Clinical Specialty

Allergy and Immunology

Emergency Medicine

Family Practice

Internal Medicine

Nursing

Preventive Medicine
Intended Users
Advanced Practice Nurses
Dietitians
Health Care Providers
Hospitals
Nurses
Pharmacists
Guideline Objective(s)  To provide evidence-based recommendations for the primary prevention of food allergy
Target Population
<ul> <li>Pregnant women</li> <li>Women who are breastfeeding</li> <li>Infants and children, including infants at high risk for food allergy</li> </ul>
Interventions and Practices Considered
<ol> <li>Exclusive breastfeeding for the first 4-6 months of age</li> <li>Hypoallergenic formulas for high-risk infants up to age of 4 months</li> <li>Standard cow's milk-based formula after age of 4 months</li> <li>Introduction of complementary food after age of 4 months</li> </ol>
Note: The following were considered but not recommended: dietary restrictions during pregnancy and lactation and dietary restrictions after age of 4 months.
Major Outcomes Considered
Development of food allergy

# Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

• Food sensitization

Methodology

Nutrition

Pediatrics

Obstetrics and Gynecology

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

#### Description of Methods Used to Collect/Select the Evidence

The development of the guideline has been informed by a systematic review of interventions for the primary prevention of food allergy in children and adults (see the "Availability of Companion Documents" field).

Systematic Review of the Evidence

The initial full range of questions that were considered important were rationalized through several rounds of iteration to agree to one key overarching question:

• What is the effectiveness of approaches for the primary prevention of food allergy?

#### Search Strategy

The following databases were searched: Cochrane Library; MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), ISI Web of Science, Turning Research into Practice (TRIP) Database, and Clinicaltrials.gov. Experts in the field were contacted for additional studies.

#### Inclusion and Exclusion Criteria

This review focused solely on studies that were primarily concerned with preventing sensitization to food(s) and/or the development of food allergy. Studies seeking to prevent potential manifestations of food allergy such as atopic eczema/dermatitis or asthma, but not including an explicit diagnosis of sensitization to food or food allergy, were not included.

Systematic reviews and meta-analyses, randomized controlled trials, quasi-randomized controlled trials, controlled clinical trials, controlled before-and-after studies, interrupted time series studies, and prospective cohort studies published up until 30 September 2012, were eligible. No language restrictions were applied and, where possible, relevant studies in languages other than English were translated.

#### Study Selection

The titles and abstracts of articles were checked by two independent reviewers and categorized as included, not included, and unsure. Full-text copies of potentially relevant studies were obtained, and their eligibility for inclusion was independently assessed by two reviewers. Any discrepancies were resolved by consensus or discussion with other reviewers.

#### Number of Source Documents

Seventy-four studies were included, comprising 15 systematic reviews (20%), 32 randomized controlled trials (43%), nine nonrandomized comparative studies (12%), and 19 cohort studies (25%).

### Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

#### Level of Evidence

Level I	Systematic reviews, meta-analysis, randomized controlled trials
Level II	Two groups, nonrandomized studies (e.g., cohort, case-control)
Level III	One group nonrandomized (e.g., before and after, pretest, and post-test)

Level IV	Descriptive studies that include analysis of outcomes (single-subject design, case series)
Level V	Case reports and expert opinion that include narrative literature, reviews, and consensus statements

#### Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

### Description of the Methods Used to Analyze the Evidence

The development of the guideline has been informed by a systematic review of interventions for the primary prevention of food allergy in children and adults (see the "Availability of Companion Documents" field).

Risk of Bias Assessment

Risk of bias was independently carried out by two reviewers using adapted versions of the Critical Appraisal Skills Programme (CASP) tool and the Cochrane Effective Practice and Organisation of Care Group (EPOC) Risk of Bias tools. An overall grading of high, medium, or low quality was assigned to each study.

Analysis, Synthesis, and Reporting

Two reviewers independently used a customized data extraction form to obtain data from each study. Discrepancies were resolved by discussion. Experts in the field checked all of the data extraction for accuracy and relevance. Meta-analysis was not appropriate because the studies were heterogeneous in focus, design, target populations, and interventions. Findings were synthesized narratively by grouping studies according to intervention and target population. These syntheses were checked by a group of methodologists and experts to ensure accuracy and relevance.

#### Methods Used to Formulate the Recommendations

Expert Consensus

### Description of Methods Used to Formulate the Recommendations

This guideline was produced using the Appraisal of Guidelines for Research & Evaluation (AGREE II) approach. This is a structured approach to guideline production that is designed to ensure appropriate representation of the full range of stakeholders, a careful search for and critical appraisal of the relevant literature, a systematic approach to the formulation and presentation of recommendations, and steps to ensure that the risk of bias is minimized at each step of the process. An overview of the approach used is provided below.

Clarifying the Scope and Purpose of the Guideline

This process began in January 2012 with a meeting to discuss the overall approach to guideline development, including detailed discussions on the main aims of the guidelines, the target conditions, clarifying the target populations, to whom the recommendations applied, agreeing the intended end-user group, and ensuring adequate professional and lay representation in the guideline development process.

Ensuring Appropriate Stakeholder Involvement

Participants represented a range of European countries, and disciplinary and clinical backgrounds (including medical secondary care, primary care, and nursing), and patient groups. The Prevention Task Force continued to work together over the ensuing 18 months through email discussions, teleconferences, and face-to-face meetings.

#### Formulating Recommendations

The authors graded the overall strength and consistency of the evidence to translate the key findings from the systematic review into evidence-linked recommendations. This involved formulating clear recommendations and making clear the strength of evidence underpinning each recommendation. This ranged from consistent evidence derived from systematic reviews of randomized controlled trials through to evidence

derived from expert consensus. Experts identified the implications of implementing the recommendations, barriers and facilitators to the implementation of each recommendation, advice on approaches to implementing the recommendations and suggested audit criteria that can help with assessing organizational compliance with each recommendation.

#### Rating Scheme for the Strength of the Recommendations

Grades of Recommendation

Grade A	Consistent level I studies
Grade B	Consistent level II or III studies or extrapolations from level I studies
Grade C	Level IV studies or extrapolations from level II or III studies
Grade D	Level V evidence or troublingly inconsistent or inconclusive studies at any level

#### Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

#### Method of Guideline Validation

External Peer Review

Internal Peer Review

### Description of Method of Guideline Validation

A draft of this guideline was externally peer-reviewed by experts from a range of organizations, countries, and professional backgrounds. Additionally, the draft guideline was available on the European Academy of Allergy and Clinical Immunology (EAACI) Web site for a 2-week period in June 2013 to allow all stakeholders to comment. All feedback was considered by the Prevention Task Force and, where appropriate, final revisions were made according to the feedback received.

All authors participated in the discussion of the systematic review, the evidence table, recommendations, gaps, and specific sections and approved the final version.

# Evidence Supporting the Recommendations

## References Supporting the Recommendations

de Silva D, Geromi M, Halken S, Host A, Panesar SS, Muraro A, Werfel T, Hoffmann-Sommergruber K, Roberts G, Cardona V, Dubois AE, Poulsen LK, Van Ree R, Vlieg-Boerstra B, Agache I, Grimshaw K, O'Mahony L, Venter C, Arshad SH, Sheikh A, EAACI Food Allergy and Anaphylaxis Guidelines Group. Primary prevention of food allergy in children and adults: systematic review. Allergy. 2014 May;69(5):581-9. PubMed

HÃ,st A, Husby S, Osterballe O. A prospective study of cow's milk allergy in exclusively breast-fed infants. Incidence, pathogenetic role of early inadvertent exposure to cow's milk formula, and characterization of bovine milk protein in human milk. Acta Paediatr Scand. 1988 Sep;77(5):663-70. PubMed

Kull I, Melen E, Alm J, Hallberg J, Svartengren M, van Hage M, Pershagen G, Wickman M, Bergström A. Breast-feeding in relation to asthma, lung function, and sensitization in young schoolchildren. J Allergy Clin Immunol. 2010 May;125(5):1013-9. PubMed

Lucas A, Brooke OG, Morley R, Cole TJ, Bamford MF. Early diet of preterm infants and development of allergic or atopic disease: randomised prospective study. BMJ. 1990 Mar 31;300(6728):837-40. PubMed

Muraro A, Dreborg S, Halken S, Host A, Niggemann B, Aalberse R, Arshad SH, Berg Av A, Carlsen KH, Duschen K, Eigenmann P, Hill D, Jones C, Mellon M, Oldeus G, Oranje A, Pascual C, Prescott S, Sampson H, Svartengren M, Vandenplas Y, Wahn U, Warner JA, Warner JO, Wickman M, Zeiger RS. Dietary prevention of allergic diseases in infants and small children. Part III: Critical review of published peer-reviewed observational and interventional studies and final recommendations. Pediatr Allergy Immunol. 2004 Aug;15(4):291-307. [92 references] PubMed

Odelram H, Vanto T, Jacobsen L, Kjellman NI. Whey hydrolysate compared with cow's milk-based formula for weaning at about 6 months of age in high allergy-risk infants: effects on atopic disease and sensitization. Allergy. 1996 Mar;51(3):192-5. PubMed

Venter C, Pereira B, Voigt K, Grundy J, Clayton CB, Higgins B, Arshad SH, Dean T. Factors associated with maternal dietary intake, feeding and weaning practices, and the development of food hypersensitivity in the infant. Pediatr Allergy Immunol. 2009 Jun;20(4):320-7. PubMed

von Berg A, Filipiak-Pittroff B, Krämer U, Link E, Bollrath C, Brockow I, Koletzko S, Grýbl A, Heinrich J, Wichmann HE, Bauer CP, Reinhardt D, Berdel D, GINIplus study group. Preventive effect of hydrolyzed infant formulas persists until age 6 years: long-term results from the German Infant Nutritional Intervention Study (GINI). J Allergy Clin Immunol. 2008 Jun;121(6):1442-7. PubMed

von Berg A, Koletzko S, Grýbl A, Filipiak-Pittroff B, Wichmann HE, Bauer CP, Reinhardt D, Berdel D, German Infant Nutritional Intervention Study Group. The effect of hydrolyzed cow's milk formula for allergy prevention in the first year of life: the German Infant Nutritional Intervention Study, a randomized double-blind trial. J Allergy Clin Immunol. 2003 Mar;111(3):533-40. PubMed

Zeiger RS, Heller S, Mellon MH, Forsythe AB, O'Connor RD, Hamburger RN, Schatz M. Effect of combined maternal and infant food-allergen avoidance on development of atopy in early infancy: a randomized study. J Allergy Clin Immunol. 1989 Jul;84(1):72-89. PubMed

Zeiger RS, Heller S, Sampson HA. Genetic and environmental factors affecting the development of atopy through age 4 in children of atopic parents: a prospective randomized controlled study of food allergen avoidance. Pediatr Allergy Immunol. 1992;3:110-27.

Zeiger RS, Heller S. The development and prediction of atopy in high-risk children: follow-up at age seven years in a prospective randomized study of combined maternal and infant food allergen avoidance. J Allergy Clin Immunol. 1995 Jun;95(6):1179-90. PubMed

## Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

# Benefits/Harms of Implementing the Guideline Recommendations

#### **Potential Benefits**

Food allergy can have a significant effect on people's morbidity and quality of life and can be costly in terms of medical visits and treatments. Given the morbidity resulting from food allergy, there is considerable scientific, professional, and lay interest in approaches that may reduce the risk of developing food allergy.

#### Potential Harms

Not stated

# **Qualifying Statements**

### **Qualifying Statements**

Challenges in Interpreting the Evidence

Food allergy is a complex topic because the symptoms are diverse and allergies can manifest in many different forms. In children, only around one-third of parentally reported food allergy can be confirmed when appropriately investigated. In the population, immunoglobulin E (IgE) sensitization to foods, as detected by skin prick test (SPT) or presence of specific IgE (sIgE), is not always associated with clinical reactions and food allergy. Because the diagnostic accuracy is suboptimal when based solely on history and/or sensitization, if possible a food allergy diagnosis needs to be confirmed by controlled elimination and challenge procedures. Unfortunately, most studies on the prevention of food allergy rely on reported reactions or surrogate markers of food allergy such as sensitization to foods (IgE and/or SPT) and disease outcomes, for example eczema. Moreover, it is important to be aware of the natural course of food allergy, as food allergies develop in the order of exposure to different foods and many children with food allergies, for example cow's milk allergy, develop tolerance during the first years of life. It is therefore important to investigate specific food allergies in the relevant age groups when they experience symptoms suggestive of food allergy and to investigate the specific food allergens that are relevant to that age group and geographic location. Finally, most studies are not sufficiently powered to detect clinically important reductions in the incidence of food allergy.

There are additional ethical and logistical challenges to be considered when interpreting or undertaking food allergy research in young children and infants. For example, it is not ethical to randomize mothers to breastfeeding, and evidence on this topic has therefore been based on high-quality observational studies. However, exclusively breastfed children may not be comparable to others due to self-selection, and these mothers may be more motivated to exclusively breastfeed due to family history of allergic problems or early symptoms in their children. Thus, there is a risk of reverse causation, which is not taken into consideration in most studies.

It is important to note that the quality assessment in the systematic review was, in keeping with standard practice, undertaken on methodological grounds, rather than on the clinical relevance or overall validity of the studies. When extracting the relevant evidence for the guidelines, it is also important to evaluate the scientific quality and clinical relevance of the studies.

Thus, for these recommendations on primary prevention of food allergy, the above-mentioned factors have been considered alongside the formal methodological quality assessment, and experimental studies reporting on confirmed food allergy are ranked highest, whereas studies with self-reported food allergy, atopic symptoms (which may represent food allergy), and sensitization as outcomes were included, but were ascribed less weight. Studies reporting only retrospective data were not included due to their high risk of bias.

# Implementation of the Guideline

## Description of Implementation Strategy

Additional supporting information for implementation may be found in the online version of this article (see the "Availability of Companion Documents" field):

• Table S1. Barriers and facilitators to implementation, audit criteria, and resource implications of recommendations.

# Implementation Tools

Audit Criteria/Indicators

# Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

**IOM Domain** 

Effectiveness

Patient-centeredness

# Identifying Information and Availability

### Bibliographic Source(s)

Muraro A, Halken S, Arshad SH, Beyer K, Dubois AE, Du Toit G, Eigenmann PA, Grimshaw KE, Hoest A, Lack G, O'Mahony L, Papadopoulos NG, Panesar S, Prescott S, Roberts G, de Silva D, Venter C, Verhasselt V, Akdis AC, Sheikh A, EAACI Food Allergy and Anaphylaxis Guidelines Group. EAACI food allergy and anaphylaxis guidelines. Primary prevention of food allergy. Allergy. 2014 May;69(5):590-601. [98 references] PubMed

### Adaptation

Not applicable: The guideline was not adapted from another source.

#### Date Released

2014 May

## Guideline Developer(s)

European Academy of Allergy and Clinical Immunology - Medical Specialty Society

# Source(s) of Funding

The production of this guideline was funded and supported by the European Academy of Allergy and Clinical Immunology (EAACI). The funders did not have any influence on the guideline production process, its contents, or the decision to publish.

#### Guideline Committee

European Academy of Allergy and Clinical Immunology (EAACI) Taskforce on Prevention

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#### Financial Disclosures/Conflicts of Interest

Conflicts of interest statements were completed by all members of the Task Force, and these were taken into account by Task Force chair as recommendations were formulated.

#### Conflicts of Interest

Susanne Halken has provided scientific advice for ALK-Abelló. Antonella Muraro has provided scientific advice for Meda. Tony DuBois has provided scientific advice for ALK-Abelló and received funding from ALK-Abelló to support his research activities. Philippe Eigenmann has provided scientific advice for Danone, Novartis, ALK-Abelló, DBV technologies and Stallergenes; he has received funding for research activities from LETI, Nestlé, and ThermoFisher. Arne Høst has provided scientific advice for ALK-Abelló and Danone. Carina Venter has produced educational material for Danone, Mead Johnson, and Nestlé and has received research funding from ThermoFisher, Danone, and Mead Johnson. Debra de Silva, Sukhmeet Panesar, and Aziz Sheikh have received funding for coordinating guideline production and generating the systematic reviews from EAACI. Aziz Sheikh has provided scientific advice to ALK-Abelló, Meda, Lincoln Medical, ThermoFisher, Pfizer, and Stallergenes; he is on the Anaphylaxis Campaign UK's Scientific Committee, World Allergy Organization's Anaphylaxis Special Committee, UK Resuscitation Council's Anaphylaxis Committee, and the BSACI's Standard of Care Committee. Gideon Lack has no conflict of interests. Kirsten Beyer has received funding for research activities from the European Union, German Research Foundation, Berliner Sparkasse, BEA-Stiftung, Food Allergy and Anaphylaxis Network, Food Allergy Initiative, Danone, ThermoFisher, DST Diagnostics, Allergopharma and has received honoraria or consultation feed from Danone, MedaPharma, ALK-Abelló, Novartis, Unilever, Allergopharma, MedUpDate, ThermoFisher, HAL. Graham Roberts and Hasan Arshad have provided scientific advice for Danone. Kate Grimshaw has provided scientific advice for Danone. Valérie Verhasselt has received research funding from Nestlé. Liam O'Mahony is a scientific consultant to Alimentary Health Ltd and has received research funding from GSK. George du Toit has received lecture fees from Nutricia and indirectly from the many sponsors of the KCL Allergy Academy. Cesmi A Akdis has received research grants from Allergopharma, Stallergenes, Actellion, and Novartis. Besides, Cesmi A Akdis was President (2011–2013), Past President (2013–2015), and ExCommember in EAACI, which has received financial support from several relevant business entities.

# This is the current release of the guideline. This guideline meets NGC's 2013 (revised) inclusion criteria. Guideline Availability Electronic copies: Available from the Allergy Journal Web site Availability of Companion Documents The following are available: EAACI food allergy and anaphylaxis guidelines. Primary prevention of food allergy. Supporting information. Electronic copies: Available from the Allergy Journal Web site • de Silva D, Geromi M, Halken S, Host A, Panesar SS, Muraro A, Werfel T, Hoffmann-Sommergruber K, Roberts G, Cardona V, Dubois AEJ, Poulsen LK, Van Ree R, Vlieg-Boerstra B, Agache I, Grimshaw K, O'Mahony L, Venter C, Arshad SH, Sheikh A on behalf of the EAACI Food Allergy and Anaphylaxis Guidelines Group. Primary prevention of food allergy in children and adults: systematic review. Allergy 2014 May;69(5):581–9. Electronic copies: Available from the Allergy Journal Web site Primary prevention of food allergy in children and adults: systematic review. Supplemental information. Electronic copies: Available from the Allergy Journal Web site Patient Resources None available **NGC Status** This NGC summary was completed by ECRI Institute on November 26, 2014. Copyright Statement This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions.

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Guideline Status

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